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Great variations in shape and size also occur among the Purkinje cells. Their extreme paucity in the hemispheres and more nearly normal relations in the vermis are also a point of importance.

All other structures at higher levels, cerebral cortex, optic thalami, red nucleus; and at lower levels, medulla, inferior olives, spinal cord, were apparently normal in every respect. The dentate nuclei were also normal.

In Russell's cat with defective cerebellum, a review of which was given in the last number of this JOURNAL, the hemisphere and dentate nucleus of one side were defective, especially the dentate nucleus, which was represented by only a few scattering cells. The inferior olivary body of the opposite side was absent as well. This difference would indicate, as Russell remarks, with almost the definiteness of an experimental extirpation, that the cells of Purkinje in the cerebellar cortex had little relation with the olivary body, while the dentate nucleus is closely associated with it. As pointing to the functions of the cerebellar cortex itself, therefore, without complications with centres at lower or higher levels, this case gives the best evidence that we have at present. C. F. H.

Studies on the Lesions Produced by the Action of Certain Poisons on the Cortical Nerve Cell.—I. Alcohol. HENRY J. BERKLEY. Brain, LXXII, 473-96, 17 Figs.

The animals used were rabbits, to which pure alcohol had been given for a considerable time, generally several months. These were compared with similar preparations from normal animals. The chief results are confirmatory of the findings of Andriezen. The blood vessels are found somewhat altered, the smallest arteries being "irregularly shrunken, at intervals almost botryoidal in appearance." This is not a constant phenomenon. The nerve cells, about one in three, are decreased in size, the nuclei appear a little irregular and shrunken, and the nucleolus especially, instead of being spherical and sharply defined, is much enlarged and very irregular in outline. By a modification of the Golgi method applicable to material already hardened in Müller's fluid, an alteration of the dendritic processes of the cortical cells in the cerebrum and cerebellum (Purkinje cells) is made out, resembling those described by Andriezen. The "contact gemmules" are lost and the processes become irregularly swollen. Berkley finds no alterations of the neuron. The affection of the dendron is the most striking alteration, and it is not claimed to be characteristic for alcohol poisoning. C. F. H.

Einige Hypothesen über den anatomischen Mechanismus der Ideenbildung, der Association und der Aufmerksamkeit. S. RAMON Y CAJAL. Archiv für Anatomie und Entwicklungsgeschichte, herausgegeben von His. 1895, 4th-6th Heft.

The Spaniard of Barcelona, of such world-wide reputation, has with perfect right ventured over the line of strict anatomy into the provinces of psychology. The invasion is a welcome one. Such scientific incursions are like that of the spies into Canaan—they bring back rich and exceedingly good fruit. The first part of the discussion deals with the question, "*Has the individual perception one or several nerve cells for underlying basis?*" The recent investigations into the structure of the nervous system all demonstrate that many, very many, cells and fibres are engaged in the slightest sensation. From the sense organ to the cortex there is a well

connected chain of conductors or neurons which transmits avalanche-like (*lawinenartig*) any single sense impressions on the periphery to an ever growing number of cells and fibres until it finally reaches the cortex. Thus in the fovea centralis retinae, in which the vision is clearest, one rod affected by light stimulus transmits the excitation to a bi-polar cell; this conducts it further to a ganglion cell beneath it (cell of the ganglion layer), the nerve process (*Fortsatz*) of which, branching out richly in the fore corpora quadrigemina, spreads the movement over a considerable number of cells, and finally the axis cylinders of these cell groups end in the occipital part of the cortex, where they come into contact by means of their branches (*Verzweigungen*), with the end brush-like formations of a large number of pyramidal cells. Thus the original peripheral unit of excitation has been able to impart its excitation to hundreds or perhaps thousands of nerve cells in the cortical centres of vision. (Spencer's analogy *re* mode of increased momentum of nerve movement—a row of bricks falling—might be suggestive here also.) So with the other senses.

The second part deals with *hypotheses concerning the histological mechanism of association of ideas, of sleep, and of the waking condition*. Duval's "*geniale*" histological hypothesis concerning the nature of sleep and rest, viz., the condition of *contact* between the nerve cells and their processes, is rejected. So also is Rabl-Rückhard's well-known hypothesis of the amoeba-like prolongations and retractions of the nerve fibres and end brushes in thought and sleep respectively. The chief causal mechanism in association, etc., Ramon y Cajal attributes to the neuroglia cells. Here we have the pseudopodian movements of contraction and relaxation. During their state of relaxation their pseudopodia extend and intervene between the cells and their protoplasmic processes and the nerve branches (*Verzweigungen*), in consequence of which the passage of the nerve currents is either completely stopped or considerably hindered. Thus we may gain an explanation of the nature of mental rest and of sleep, both natural and artificial (narcotics, hypnotism). The third part is on the *theory of attention*. One of the three kinds of neuroglia cells are the *perivascular* cells. These are found only in the neighborhood of the capillaries of the gray substance. Each capillary has inserted in it thousands of these neuroglia pseudopodia, which diverge in all directions. Upon contraction of these there follows a local enlargement of the vessels, and thereby greater physiological congestion. This congestion of the capillary vessels increases their size, filling out almost the whole of the surrounding lymph space. Hence the *monoidism* of attention. At the close of the article, which is full of suggestions and details, the author calls attention to the hypothetical nature of some of his conclusions.

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II. EXPERIMENTAL.

Die Aufmerksamkeit und die Function der Sinnesorgane. Von DR. W. HEINRICH. Erster Beitrag. Zeitschrift für Psychologie und Physiologie der Sinnesorgane, IX, Heft 5 u. 6.

The latter part of this article is experimental in nature. Helmholtz ("Physiol. Optik," 1867, S. 741) makes the assertion that attention is independent of the accommodation of the eye, basing his assertion upon the facts of indirect vision. While steadily fixating